Hazard Profile – Hazardous Materials

Summary

- The Hazard – Hazardous materials incidents include the unwanted, unplanned, or deliberate release or escape of explosive, flammable, combustible, corrosive, reactive, poisonous, toxic, or radioactive substances that may cause or create a potential risk to public health, safety, or the environment.
- Previous Occurrences – Washington has a varied history of hazardous materials incidents and while some appear to be on the downward trend (such as drug lab incidents) others remain fairly constant, but vary by location and amount (oil and chemical spills or releases, etc.).
- Probability of Future Events – Determining the probability of future hazardous materials incidents is difficult because so many factors can contribute and there are so many different types of incidents.
- Jurisdictions at Greatest Risk – Hazardous materials incidents have impacted every county in the state and are dependent upon a variety of conditions. Western Washington counties are most at risk due to dense industrial and populated areas and major transportation routes surrounding the fragile ecosystems of the Puget Sound and coastal waterways. Some Eastern counties are increasingly at risk with increases of population, industry, and transportation. For the purpose of this profile, analysis will not be conducted to determine the jurisdiction of greatest risk.
- Special Note – This profile will not attempt to estimate potential losses to state facilities due to hazardous materials incidents.

Introduction[1, 2, 3, 4]

Hazardous materials are defined as such because of their chemical, physical, or biological nature which can pose a potential risk to human health, property, or the environment when released. A release may occur by spilling, leaking, emitting toxic vapors or any other process that enables the material to escape its container, enter the environment, and create a potential hazard. Potential sources of hazardous material releases include, but are not limited to: superfund sites, storage facilities, residences, manufacturers, transportation carriers, hospitals/medical facilities, veterinary hospitals/clinics and Brownfield sites. The hazard can be explosive, flammable, combustible, corrosive, reactive, poisonous, toxic, or radioactive, and can exhibit qualities of a biological agent. There are also naturally occurring hazardous materials releases. These naturally occurring hazardous material releases may produce the same potential risk to human health as the manufactured chemicals or agents.

In addition to the standard definition of hazardous materials, there are other agents which also fall into this category. One example is Etiologic agents.

Etiologic agents are those microorganisms and microbial toxins that cause disease in humans and include bacteria, bacterial toxins, viruses, fungi, rickettsiae, protozoans, and parasites. These disease-causing microorganisms may also be referred to as infectious agents. Arthropods and other organisms that transmit pathogens to animals (including humans) are called vectors. Etiologic agents, vectors, and materials

containing etiologic agents are recognized as hazardous materials. Materials containing etiologic agents are regularly transported from one location to another by common land and air carriers, and are both imported and/or exported.

Radioactive materials (i.e., those materials that emit beta or gamma radiation) are not addressed in this section of the assessment.

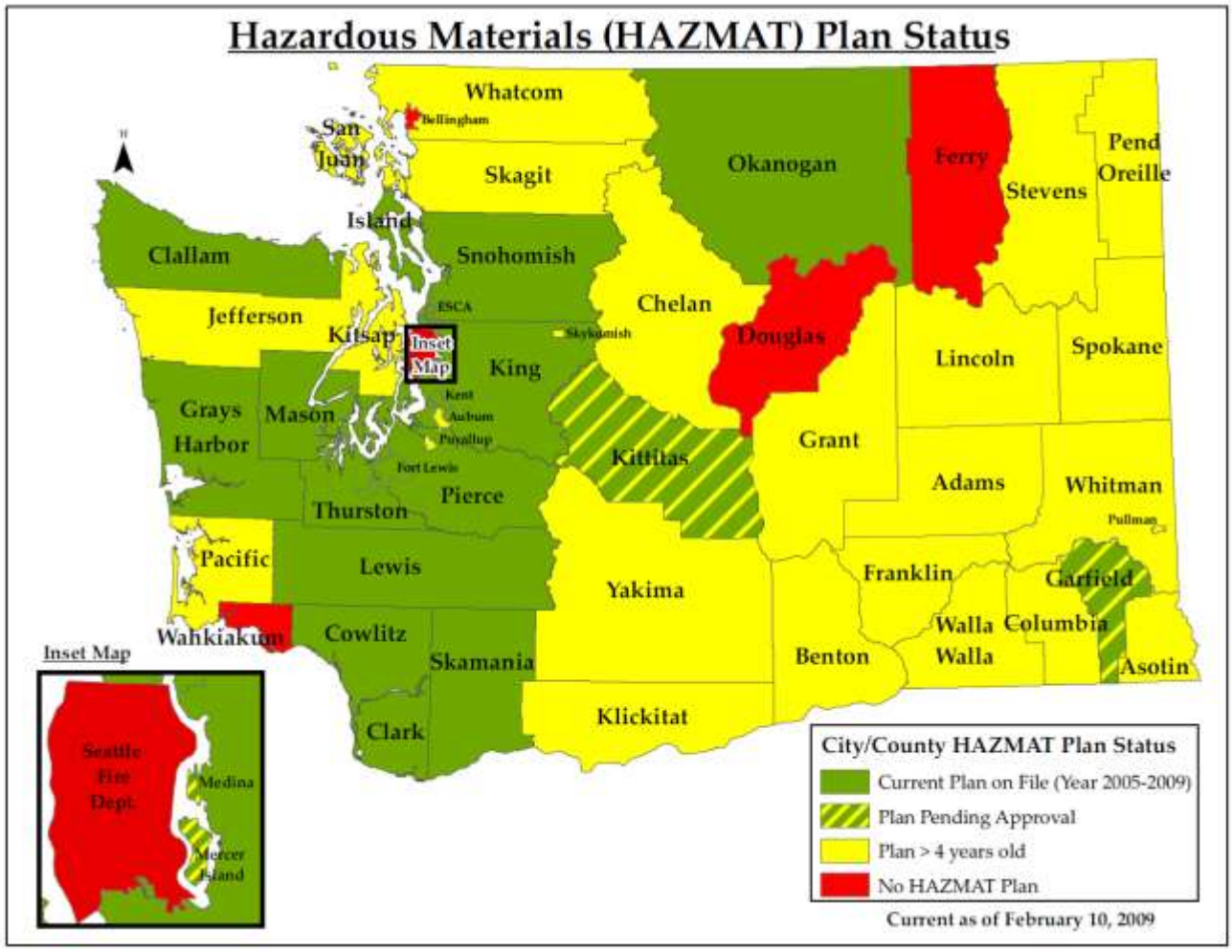
Hazardous materials incidents can occur during the manufacture, transportation, storage and use of hazardous materials, as well as being naturally occurring. These incidents can occur as a result of human error, natural hazards, deliberate deed, or a breakdown in equipment or monitoring systems. The impact depends upon the quantity and physical properties of the chemical, environmental and weather factors at the point of release, the type of release and its proximity to human and wildlife populations and valuable ecosystems.

In 1986 Congress enacted the Emergency Planning and Community Right to Know Act (EPCRA) as part of the Superfund Amendments and Reauthorization Act (SARA) as a result of public concern regarding the environmental and safety hazards posed by the storage and handling of toxic chemicals. These concerns were prompted by the 1984 disaster in Bhopal, India, in which several thousands of people died and many more suffered serious injuries from the accidental release of methyl isocyanate followed by the 1985 incident in Institute, West Virginia where two factory employees died and hundreds of nearby residents went to the hospital from the accidental release of aldicarb oxime. This act, known as SARA Title III, established requirements for federal, state, tribal, and local governments as well as industry regarding emergency response planning and the public's right to know about hazardous chemicals stored and released in their community. These provisions help increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment.

In 1987, Washington adopted the Federal SARA Title III regulations in Chapter 118-40 Washington Administrative Code and established the Washington State Emergency Response Commission (SERC) to oversee implementation of requirements imposed by SARA Title III, including the creation of planning districts, designation of the Local Emergency Planning Committees (LEPC), and the development of a statewide master plan for hazardous materials incident response. The Washington SERC is comprised of a broad-based membership including representatives from private industry, state and local agencies. In addition, the Washington State Patrol, the Washington State Military Department - Emergency Management Division, the Department of Ecology, and the Washington State Patrol have specific responsibilities under the state regulation. The LEPC's representation consists of local elected officials, law enforcement, emergency management, fire fighting, health professionals, hospital, transportation, environmental, media, community groups, and industry representatives for each planning district. LEPCs are required to develop a local emergency plan for their district and to collect EPCRA information submitted by industry. According to the Department of Ecology, in 2009 Washington State has 43 LEPCs, one for each of Washington's 39 counties as

well as for the cities of Kent, Seattle, the Southwest Snohomish Emergency Services Coordinating Agency, and the Fort Lewis military installation/reservation.

Figure 1 below illustrates the status of Hazardous Materials Plans as of February 2009.



The Washington SERC requires that all facilities or businesses that have reportable quantities of certain chemicals must complete a Tier Two – Emergency and Hazardous Chemical Inventory report annually for each substance present. The Washington Department of Ecology receives all EPCRA reports and manages EPCRA data on behalf of the Washington SERC. Most EPCRA reports must also be submitted to the LEPC, the local fire department or, when appropriate, to tribal nations.

The following hazardous materials categories are considered for this profile:

- Spills – Hazardous materials spills either at fixed facilities or on transportation routes which include via water, land and pipeline.
- Methamphetamine Labs
- Hanford Nuclear Reservation

Background

Spills [5, 6, 7]

In Washington State over 20 billion gallons of oil and hazardous chemicals are transported by ship, barge, pipeline, rail and road each year. Equipment failure and human error in these situations can lead to oil and chemical spills that threaten public health, and wildlife, contaminate the environment and ultimately damage the state's economy and quality of life.

The Department of Ecology's Spill Prevention, Preparedness and Response Program works to protect Washington's environment, public health and safety through a variety of methods aimed first at preventing, but also by responding to spills when they do occur. Spill prevention actions include establishing a stricter oil transfer program for commercial maritime operations, increasing refinery, pipeline and vessel inspections, and stationing a government-funded rescue tug at Neah Bay to aid disabled vessels through emergency towing and salvage services.

The yellow portion of the pie charts in Figure 2 below represents the number of reported hazardous materials incidents within Washington State during the time period 1994-2009.

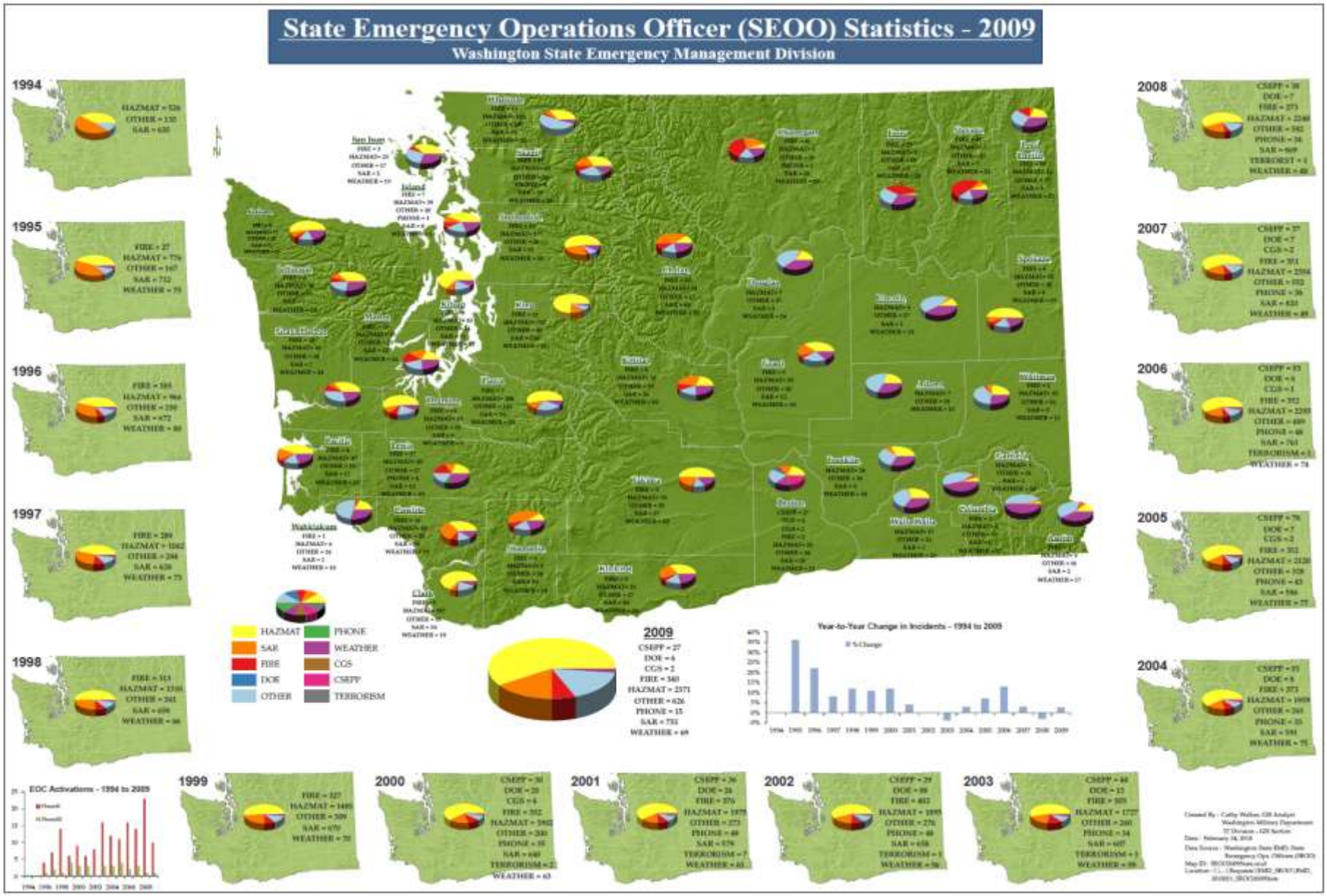


Figure 2 2009 State Statistics

In an effort to help citizens, government, and industry better prepare for emergency response to chemical releases, the SERC assembles and disseminates Tier Two data for facilities covered under the federal Community Right-to-Know laws. Reporting thresholds are: 10,000 pounds of a *hazardous substance* at any one time, and 500 pounds or less of an *extremely hazardous substance,* depending on the chemical. The graphics below indicate the total number of Tier Two reporting facilities and reportable substances by county for 2008 for both hazardous substances and extremely hazardous substances.

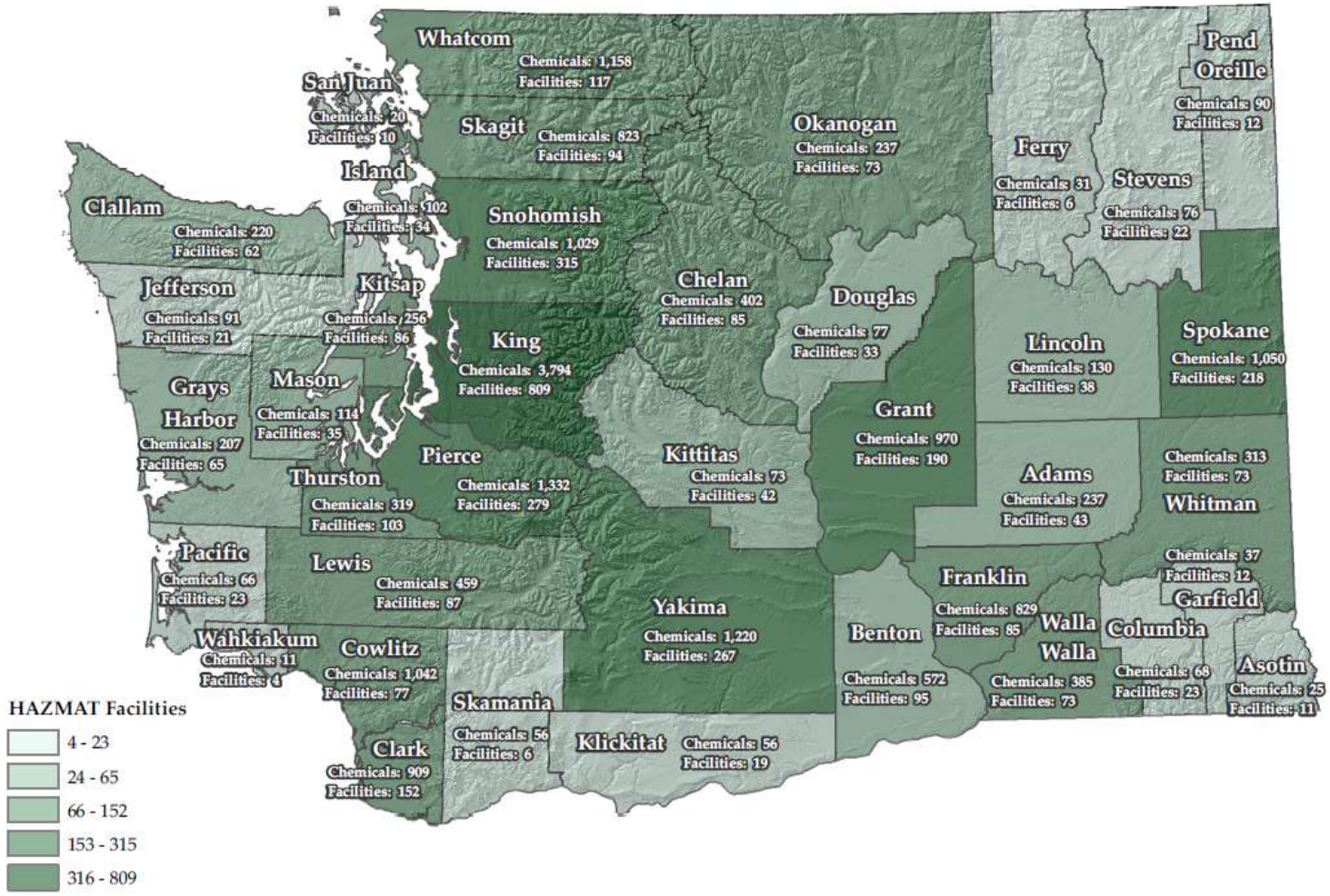


Figure 3 represents the 2008 total number of facilities within each county which report having hazardous chemicals, as well as the number of various types chemicals within the county which require reporting.

Washington State - Community Right-to-Know

Total Extremely Hazardous Chemicals and Facilities by County, 2008

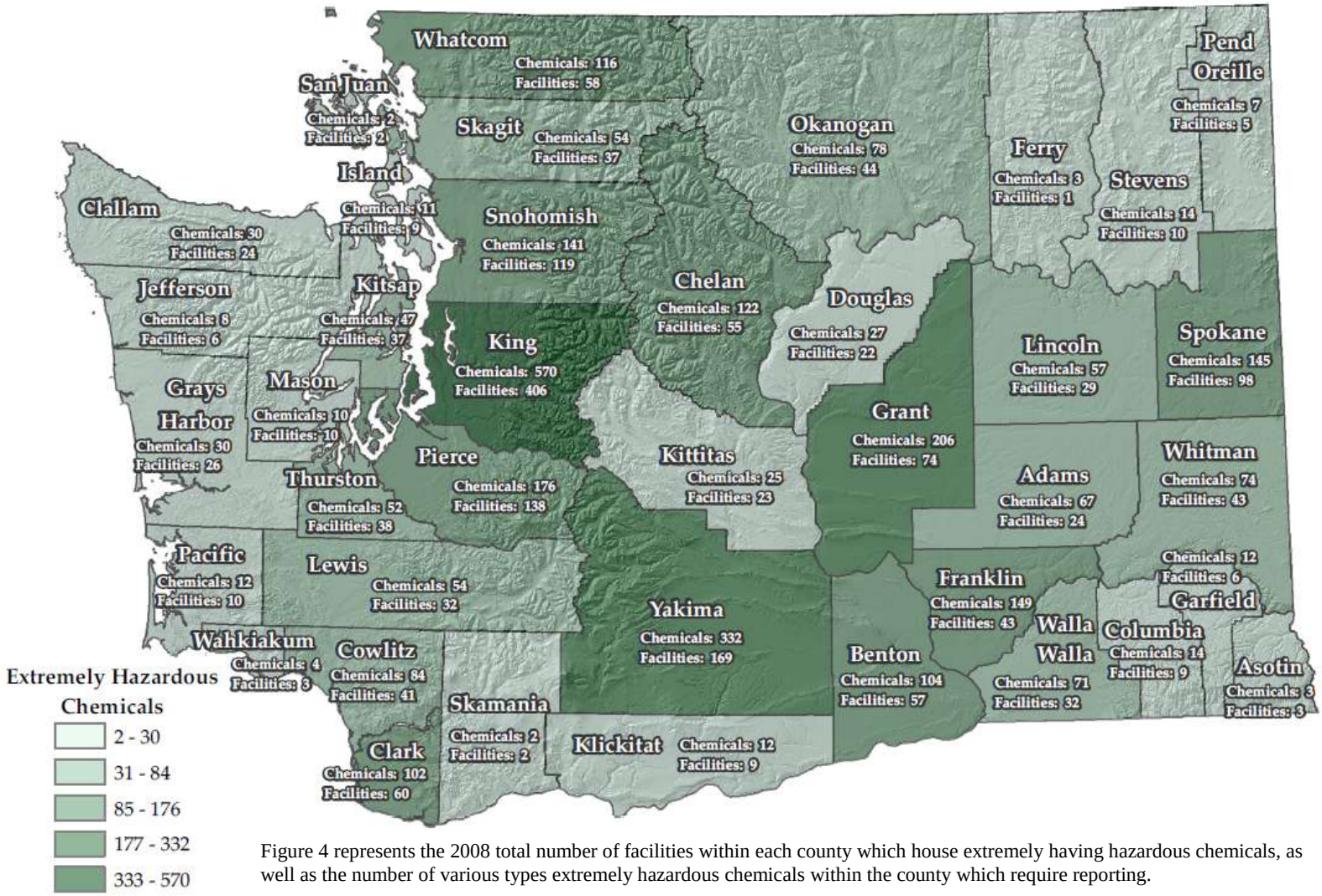


Figure 4 represents the 2008 total number of facilities within each county which house extremely having hazardous chemicals, as well as the number of various types extremely hazardous chemicals within the county which require reporting.

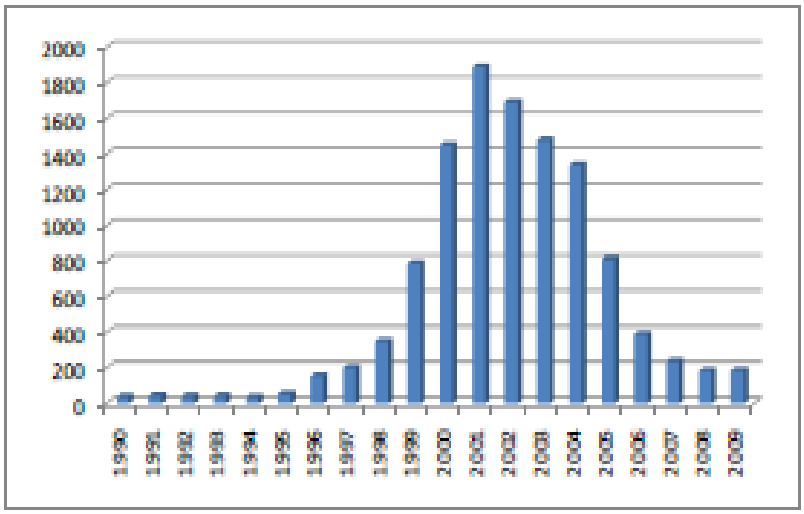
Methamphetamine Labs [8, 9, 10]

Illegal drug labs encountered by state and local agencies increased dramatically from 38 in 1990 to 1,890 in 2001 when a downward trend began with 184 in 2008, ending with 186 in 2009. This downward trend leveled off in 2009, as indicated by Washington State Department of Ecology (Ecology). Ecology is responsible for handling and disposing of hazardous substances found at illegal drug lab sites. Nearly all of Washington's clandestine drug labs manufacture methamphetamine – also called *meth*, *crystal*, *crank*, or *speed*.

DRUG / METHAMPHETAMINE LAB INCIDENTS
1990-2009

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
38	43	40	42	36	54	153	203	349	789	1454	1890	1693	1480	1341	809

2006	2007	2008	2009
390	237	184	186



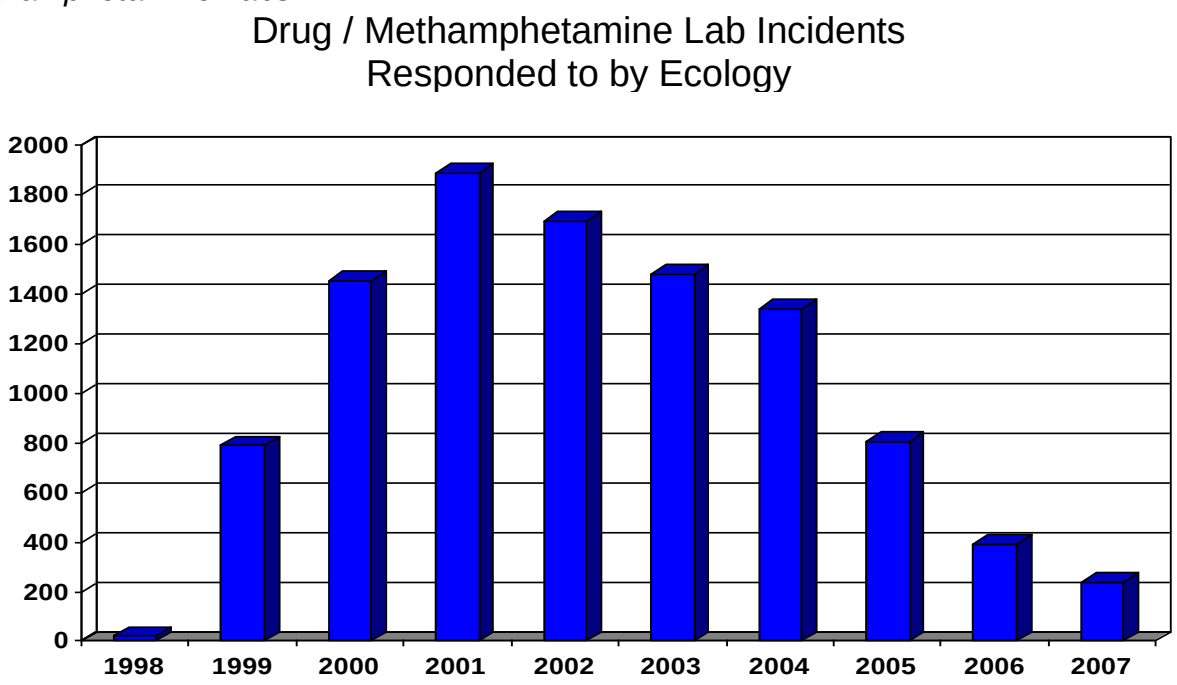
Source: Washington State Department of Ecology. Available at:
http://www.ecy.wa.gov/programs/spills/response/drug_labs/drug_lab_main.htm

Law enforcement intelligence indicates the recent decline may correspond with inexpensive drugs manufactured in Mexico entering the United States.

Nearly all of Washington's clandestine drug labs manufacture methamphetamine. The drug is produced using a combination of hazardous, toxic materials to include acids, sodium hydroxide, flammable solvents, anhydrous ammonia, lithium and sodium metals, and red phosphorus. Some of these toxic materials can cause injury or death if inhaled or touched often enough, while others can react violently if heated, mixed with water or exposed to air.

While the Department of Ecology is responsible for responding to reports of drug labs and disposing of the hazardous substances found there. Many other agencies play a role in drug lab response to include the Washington State Patrol and local police, health and fire departments. Many of the drug labs are considered *mobile labs*, meaning the drugs are stored in a vehicle which moves from location to location. This type of lab is, in many respects, more hazardous because the law enforcement officer, when making a routine traffic stop, is unaware that the vehicle contains the chemicals, potentially exposing himself. Likewise, anyone who has come in contact with the vehicle – either as a passenger or someone simply leaning or brushing up against the vehicle in a parking lot – become contaminated. That person then also becomes a carrier of the chemical, potentially contaminating other sites and people. Within the State of Washington, Pierce and King Counties rank numbers 1 and 2 with respect to the most active labs during the 1990-2009 time period.

Methamphetamine Labs[11]



1998-2003 Drug Labs Reported to Ecology
2004-2007 Responses to Methamphetamine Incidents

Department of Ecology - Spill Response
Clandestine Drug Lab and Dump Site Cleanup Activity
1990 through 2009

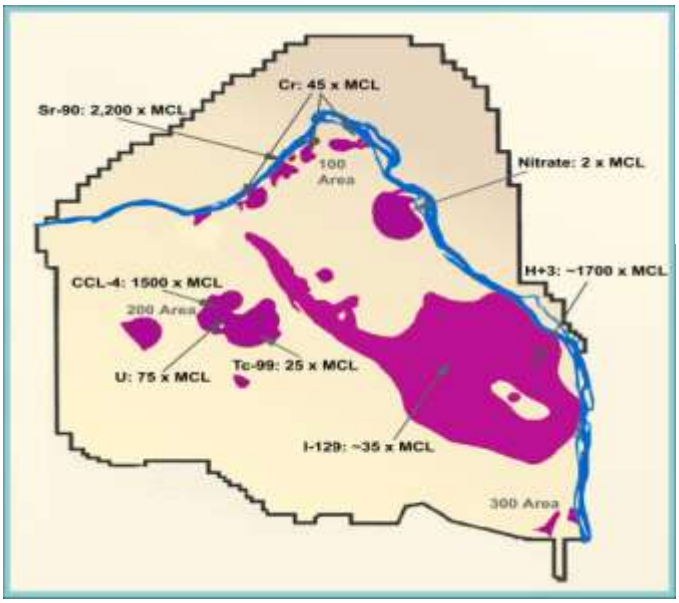
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	TOTAL
Adams								1		1		3	4	4			1			2	14
Asotin										1	1	5	3	4						1	14
Benton				1		1	3	4	7	38	52	85	87	82	57	16	13	9	4		459
Chelan				1		1	1			2	14	34	15	13	9	3		6	1	1	101
Clallam					1	1	1	3	3		1	3	10	2	2		2	3	3		35
Clark	5	2	4	1	3	3	12	20	12	16	34	57	57	35	28	18	9	6	4	4	330
Columbia										1	3	2	1	4	1		1				13
Cowlitz			3	1		1	3	9	2	8	7	9	28	18	11	6	5	3	4	1	119
Douglas									1	1	6	5	7	4	8	6					38
Ferry											7	4									11
Franklin									1	8	10	15	11	13	14	3	1			1	77
Garfield										2			4	1		1					8
Grant			2			1				2	19	27	46	34	14	11	15			7	178
Grays Harbor	3	1		2	2	1	3	5	5	16	24	41	32	50	27	28	2	14		2	258
Island						1		1	2	5	1	5	5	14	18	5	6	4	4	22	93
Jefferson								1	1	2	7	6	4	12	2	1	5		1	1	43
King	6	10	2	7	7	10	23	17	48	107	231	271	241	202	199	123	63	42	37	16	1662
Kitsap	1	1	2	1			3		1	21	45	54	60	50	44	18	2	1	1		305
Kittitas				1		1			1	3		5	3	5	3	6		3			31
Klickitat			1			1	1	1	3		6	4	2	1		1	2	1	2		26
Lewis	3	1	1	2	3	4	7	9	31	33	43	61	83	67	30	22	14	3	5	6	428
Lincoln			1									5	3	2	1	1	1	1			15
Mason	3			2			4	4	10	21	32	30	22	15	32	32	6	4	7	3	227
Okanogan			1					2	3	2	2	3	3	1	4		3	1			25
Pacific						1		4	1	6	2	3	4	3	2	2					28
Pend Oreille				1				2	6	10	12	5	12	6	7	5	2				68
Pierce	10	18	18	12	17	17	53	42	129	318	545	589	438	466	542	349	148	76	71	56	3914
San Juan												1	1								2
Skagit				1		1			4	2	5	11	34	12	31	12	9	4	3		129
Skamania	1									2	1	2	3	3	1	1	2	2			18
Snohomish	2	2		2			7	6	5	13	37	69	83	98	102	43	14	15	12	19	529
Spokane					1	2	1	7	11	36	137	248	189	91	42	21	28	14	3	16	847
Stevens		1					1	1		5	4	15	10	3	5	5	3	2		3	58
Thurston	1	4	5	4	2	6	25	63	58	86	139	151	115	96	62	37	18	6	15	7	900
Wahkiakum										1		2	2	2		1	1				9
Walla Walla									2	8	12	16	15	16	9	4	1	8	2	3	96
Whatcom				1								5	9	24	25	14	6	2	3	4	93
Whitman											1	3	4		2	5				1	15
Yakima	3	3		2		1	5	1	2	12	14	36	43	27	7	9	7	7	2	10	191
TOTAL	38	43	40	42	36	54	153	203	349	789	1454	1890	1693	1480	1341	809	390	237	184	186	11407

Hanford Nuclear Reservation[12,13]

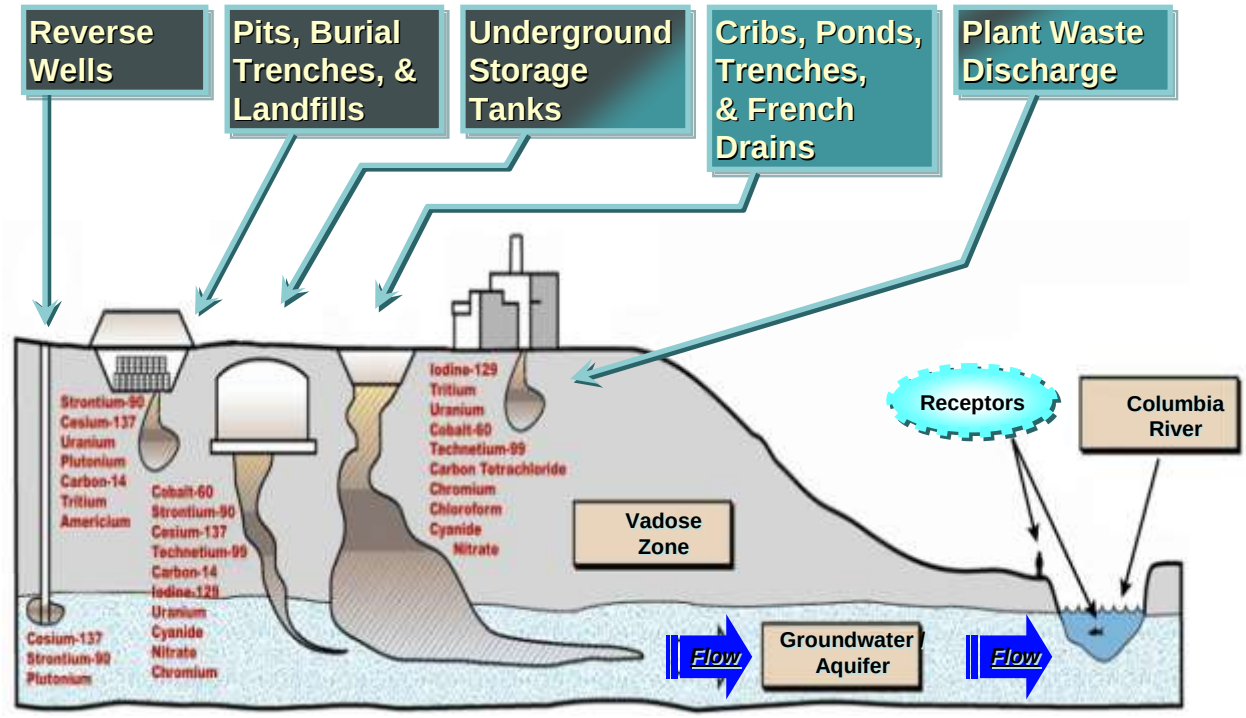
The Hanford Nuclear Reservation was built by the US government in 1943 as the home for the Manhattan Project, the wartime effort to build the atomic bomb. The 560 square mile site bordering 51 miles of the Columbia River near the cities of Richland, Pasco and Kennewick, Washington, is the most contaminated site in North America, holding more than 60 percent of the nation's highly radioactive and chemically hazardous wastes. These 53 million gallons of high level radioactive hazardous wastes are stored in 177 underground tanks, 149 of which are leak-prone, single-shelled tanks posing a serious threat to the land, the nearby Columbia River, human health and the region's economy. Already, 67 of the single-shelled tanks have leaked about one million gallons of highly toxic contaminants into the ground and are moving through groundwater toward the Columbia River. If cleanup does not proceed on schedule, the contamination will reach the Columbia River in 12 to 50 years depending on the specific location and type of contamination.

Approximately one million people live in the 42 cities and towns downstream from the Hanford site. About 8,000 farms worth an estimated $6.4 billion are located in and around these communities. The region contributes to 10 percent of Washington's overall economy and 30 percent of Oregon's economy.

<u>Combined Chemical and Radiological Groundwater Contamination (purple areas) Above Drinking Water Standard: Approximately 80 square miles</u>



Sources of Contamination

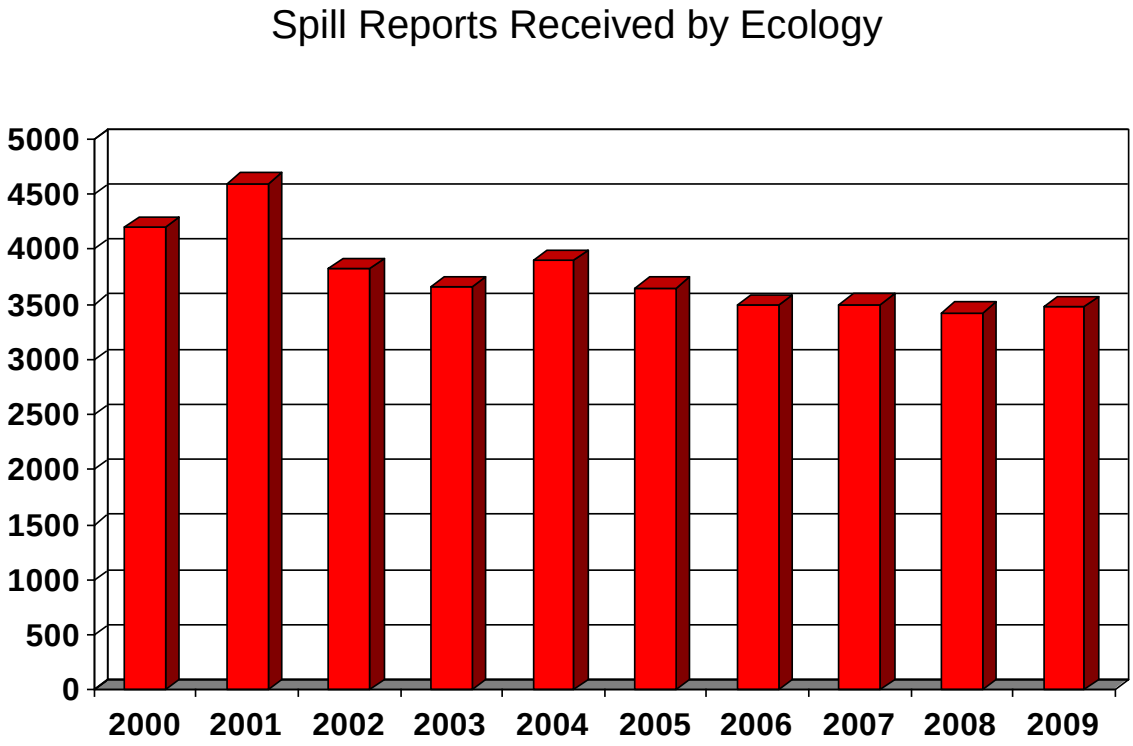


Hanford Nuclear Reservation[14]

The most recent significant release of radioactive hazardous waste at the Hanford Nuclear Reservation tank farm was on July 27, 2007. Contractor CH2M Hill Hanford Group was pumping waste from a single-shell tank and tried to unblock the pump by running it in reverse. "Over 80 gallons of highly radioactive tank waste spilled," according to the manager of Ecology's Nuclear Waste Program. Upon investigating the circumstances around the spill, Ecology determined a series of administrative and engineering failures contributed to the accident including inadequacies in the design of the waste retrieval system.

Significant Hazardous Material Incidents in Washington State

Spills [15,16,17,18,19]



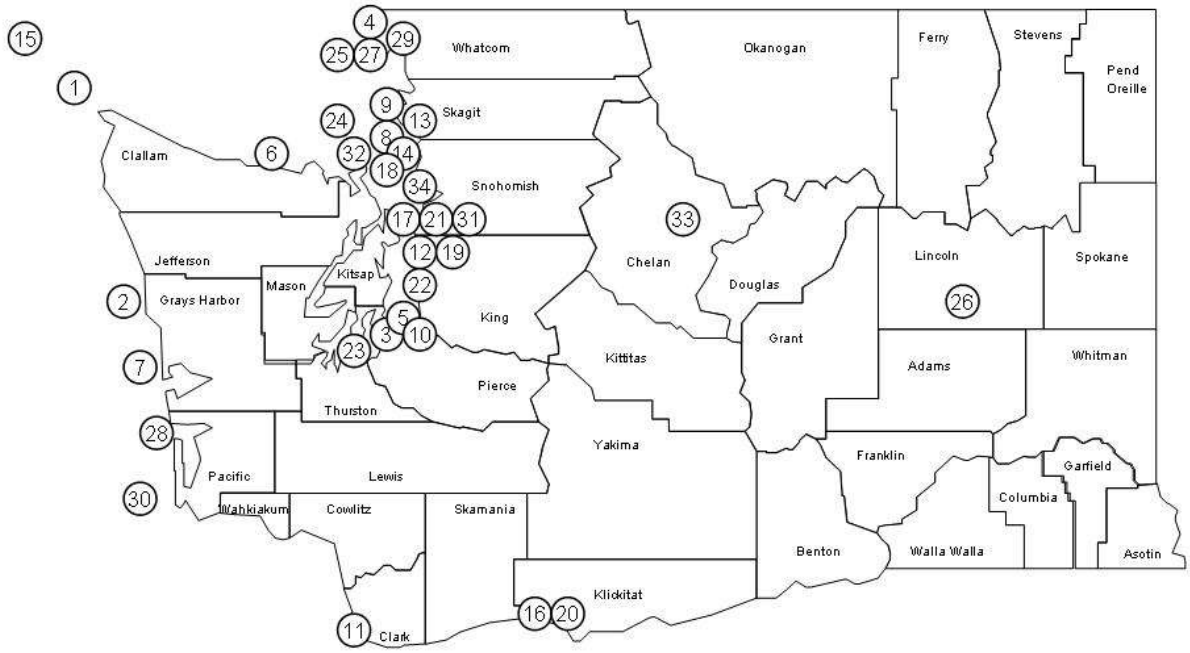
* Includes spills to water, soil, roads, air, etc by oil, hazmat, & other pollutants (sewage, dairy waste, etc)

Spills Over 10,000 Gallons				
	Incident Date	Incident Name	Total Quantity Spilled (gallons)	Product Type
1	1/1/1972	V_General MC Meiggs	2,300,000	Heavy Fuel Oil
2	3/10/1964	V-United Transportation Barge	1,200,000	Diesel Fuel
3	1/6/1991	F-US Oil and Refining Company	600,000	Crude Oil
4	1/10/1973	P-Trans-Mountain Pipeline	460,000	Crude Oil
5	10/18/1993	F-US Oil	264,000	Crude Oil
6	12/21/1985	V-Arco Anchorage	239,000	Crude Oil
7	12/23/1988	V-Nestucca Barge	231,000	Heavy Fuel Oil
8	4/26/1971	V-United Transportation Barge #U	230,000	Diesel Fuel
9	2/22/1991	F-Texaco Refinery	210,000	Crude Oil
10	1/17/1990	F-PNW Terminals Tallow Spill	200,000	Other Oil, Tallow
11	3/20/1984	V-SS Mobil Oil Tanker Spill	200,000	Heavy Fuel Oil
12	8/10/1990	F-Chevron Richmond Beach Park	176,000	Other Oil
13	9/23/1983	P-Olympic Pipeline	168,000	Diesel Fuel
14	3/27/1990	F-Texaco Refinery	130,000	Diesel Fuel
15	7/22/1991	V-Tenyo Maru	100,000	Heavy Fuel, Oil & Diesel
16	1/1/1978	V-Columbia River Barge	100,000	Diesel Fuel
17	2/25/1990	F-Manchester Naval Supply Depot	70,000	Diesel Fuel
18	1/31/1988	V-MCN#5 Barge	70,000	Heavy Fuel Oil
19	5/8/1986	P-Olympic Pipeline	70,000	Other Oil
20	4/20/1996	T-Wind River Train Derailment	65,000	Diesel Fuel
21	12/6/1996	F-GATX Harbor Island	49,000	Gasoline, Unleaded
22	11/28/1985	P-Olympic Pipeline	34,000	Jet Fuel
23	7/14/1990	F-PNW Terminals	30,000	Other Oil, Tallow
24	12/31/1994	V-Crowley Barge 101	26,900	Diesel Fuel
25	6/4/1972	V-World Bond	21,000	Crude Oil
26	11/3/1992	P-Chevron Pipeline	20,000	Jet Fuel
27	12/31/1980	F-Whatcom Creek Penta Spill	20,000	Other Oil
28	4/27/1980	V-Willapa Bay Spill	20,000	Other Oil
29	4/23/1974	P-Trans Mountain Pipeline	16,128	Crude Oil
30	6/24/1990	V-Sulak	15,000	Diesel Fuel
31	2/7/1990	P-Olympic Pipeline	12,600	Diesel Fuel
32	8/12/1988	F-NAS Whidbey Island	11,000	Jet Fuel
33	1/1/1991	T-Monitor Tanker (land transport)	10,000	Gasoline
34	3/28/1990	F-US Navy Supply Center	10,000	Diesel Fuel

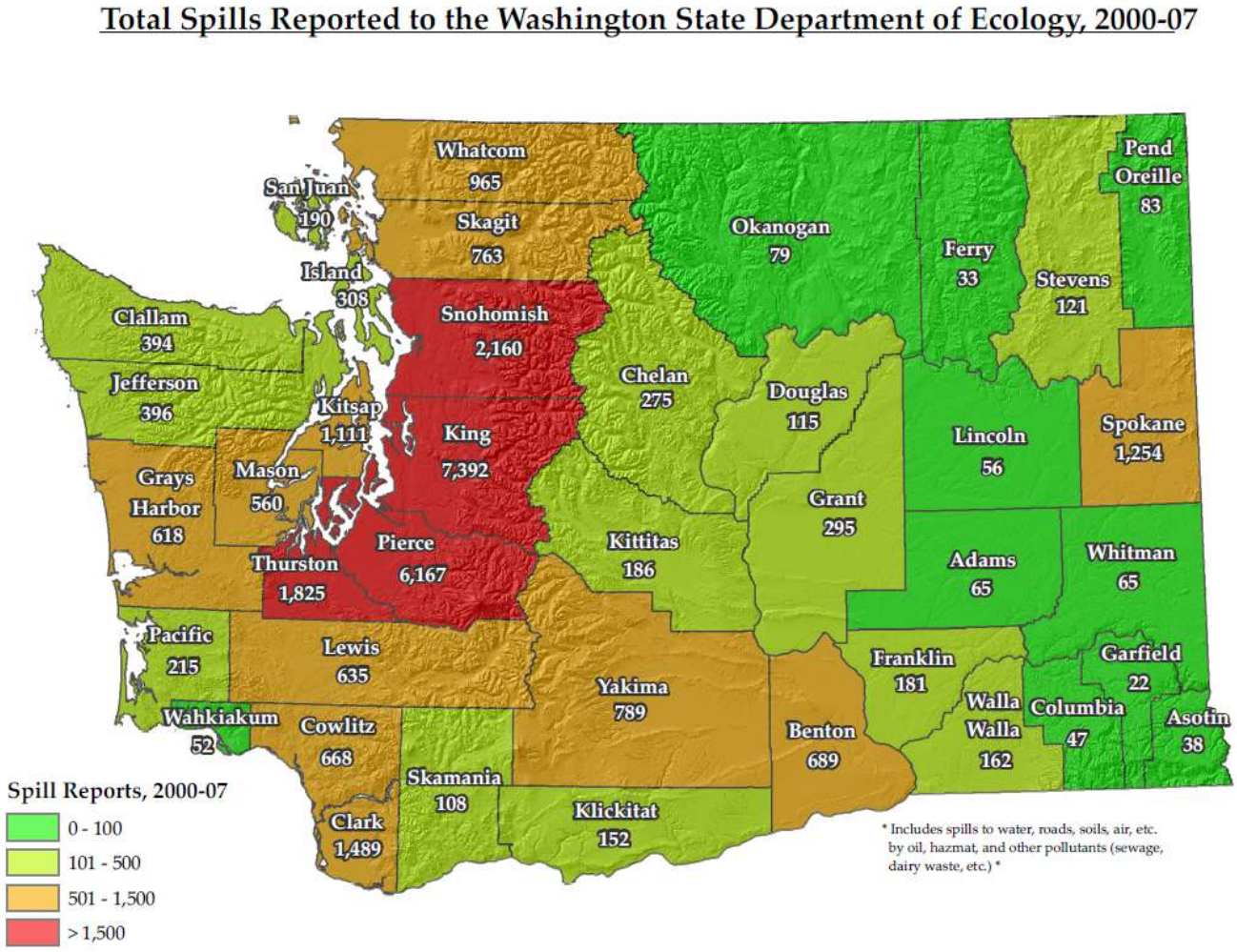
V = Vessel spill, P = Transmission pipeline spill, F = Facility spill

Note: see graphic below for location of these spills.

Location of Spills Over 10,000 Gallons

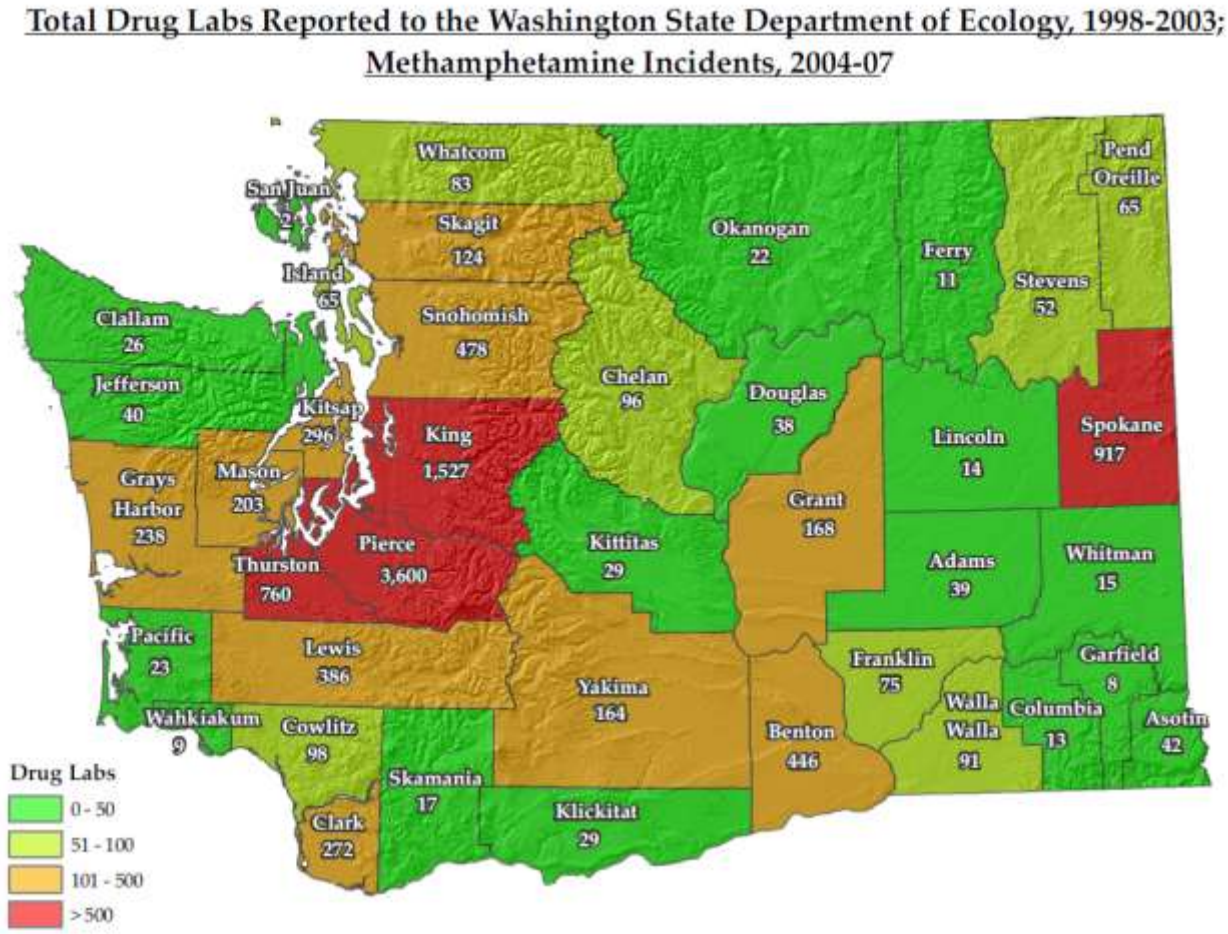


Spill Reports Reported to Department of Ecology



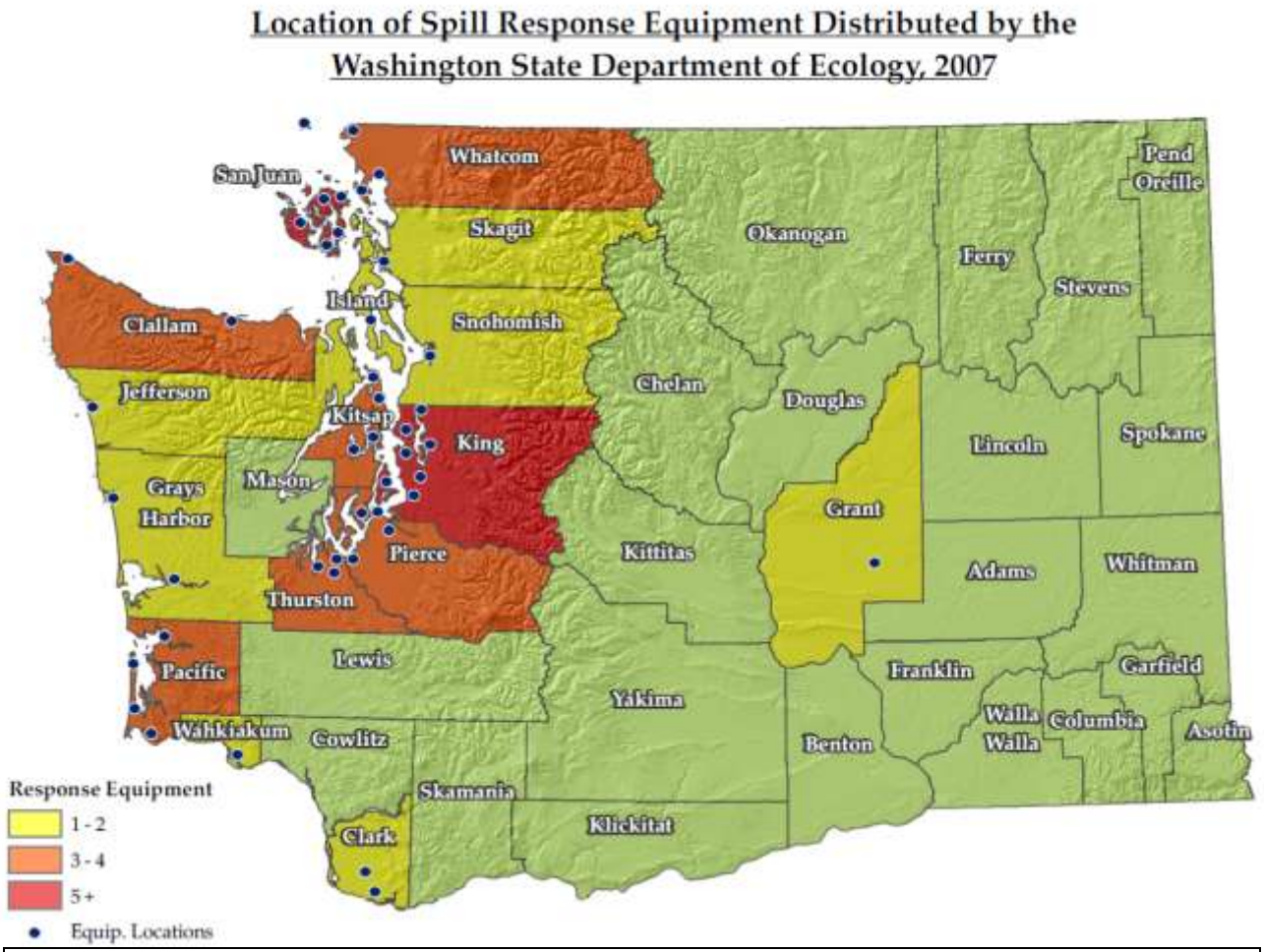
Total Spill Reports Reported to Ecology, 2000-2007			
County	**Spills**	**County**	**Spills**
King	7392	Yakima	789
Pierce	6167	Skagit	763
Snohomish	2160	Benton	689
Thurston	1825	Cowlitz	668
Clark	1489	Lewis	635
Spokane	1254	Grays Harbor	618
Kitsap	1111	Mason	560
Whatcom	965		

Drug Labs Reported to / Methamphetamine Incidents Responded to by Ecology



Total Drug Labs Reported to Ecology, 1998-2003 & Meth Incidents, 2004-2007			
County	**Incidents**	**County**	**Incidents**
Pierce	3600	Kitsap	296
King	1527	Clark	272
Spokane	817	Grays Harbor	238
Thurston	760	Mason	203
Snohomish	478	Grant	168
Benton	446	Yakima	164
Lewis	386	Skagit	124

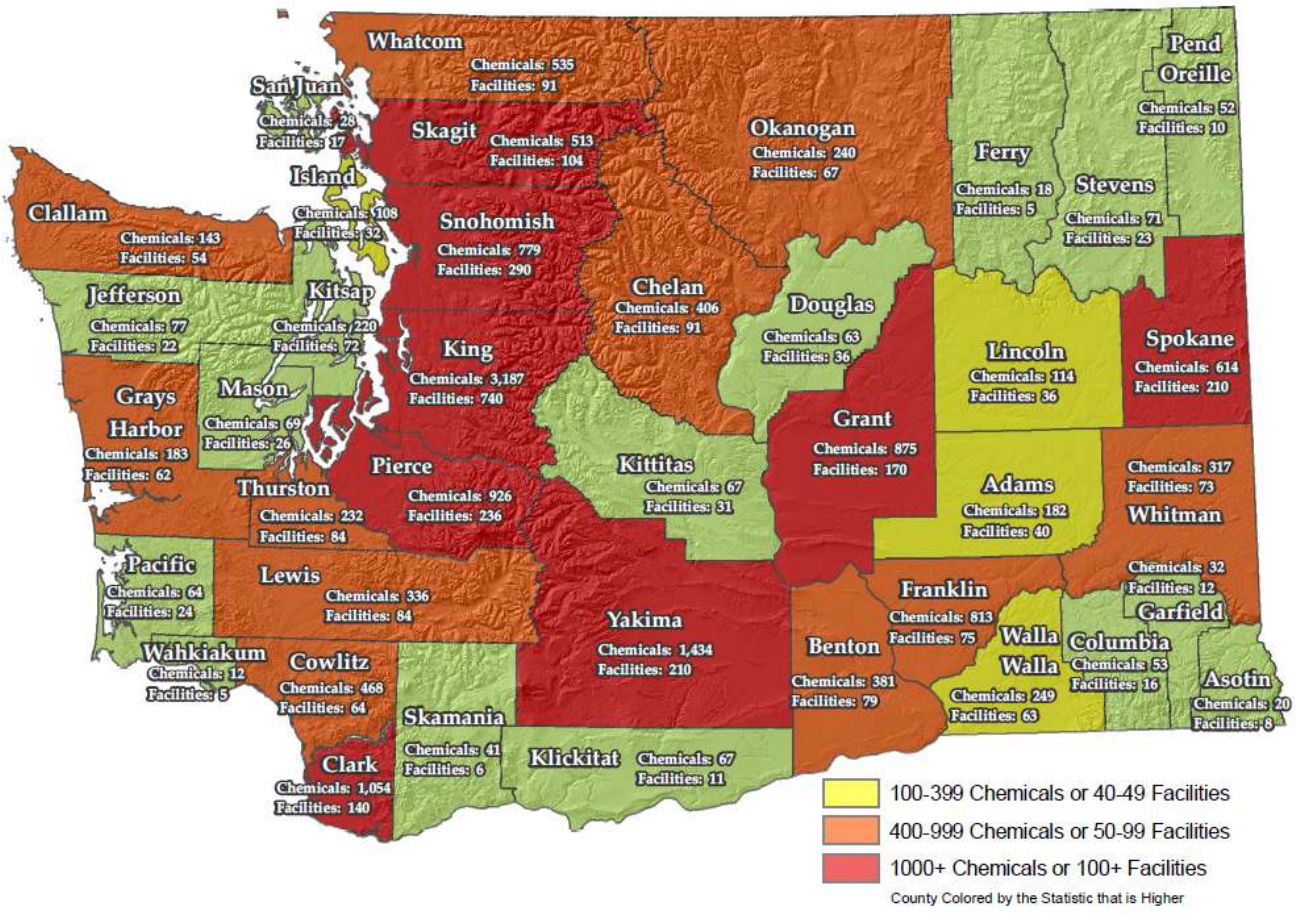
Location of Spill Response Equipment Distributed by Ecology



Location of Spill Response Equipment Distributed by Ecology, 2007			
County	**Equipment #**	**County**	**Equipment #**
King	7	Clark	2
San Juan	5	Grays Harbor	2
Kitsap	4	Jefferson	2
Pacific	4	Grant	1
Pierce	4	Island	1
Whatcom	4	Skagit	1
Clallam	3	Snohomish	1
Thurston	3	Wahkiakum	1

Total Tier II Facilities and Chemicals

Total Facilities and Chemicals by County, 2004



Total Tier II Facilities & Chemicals			
County	**Chemicals/Facilities**	**County**	**Chemicals/Facilities**
King	3187 / 740	Benton	381 / 79
Yakima	1434 / 210	Lewis	336 / 84
Clark	1054 / 140	Whitman	317 / 73
Pierce	926 / 236	Okanogan	240 / 67
Grant	875 / 170	Thurston	232 / 84
Franklin	813 / 75	Kitsap	220 / 72
Snohomish	779 / 290	Grays Harbor	183 / 62
Spokane	614 / 210	Adams	182 / 40
Whatcom	535 / 91	Clallam	143 / 54
Skagit	513 / 104	Lincoln	114 / 36
Cowlitz	468 / 64	Island	108 / 32
Chelan	406 / 91		

[1] *Washington State 2001 Hazard Identification and Vulnerability Assessment*, Washington State Military Department, Emergency Management Division, April 2001.

[2] Emergency Planning and Community Right-to-Know Act (EPCRA) Requirements website, Environmental Protection Agency, http://www.epa.gov/emergencies/content/epcra/index.htm, retrieved April 3, 2008.

[3] Emergency Planning and Community Right-to-Know Act website, Washington State Department of Ecology, http://www.ecy.wa.gov/epcra/index.html, retrieved April 3, 2008.

[4] Centers for Disease Control and Prevention. Etiologic Agents Import Permit Program. Accessed 5 Feb. 2009. Available at: http://www.cdc.gov/od/eaipp/

[5] *Spill Prevention, Preparedness & Response Program: Overview 2007-09,* Publication #07-01-035, Washington State Department of Ecology, http://www.ecy.wa.gov/programs/spills/other/overbook_spills.pdf, retrieved March 3, 2008.

[6] *Spill Scene 2006 Annual Report*, Volume 10, Number 1, February 2007, WDOE Publication 07-08-002, ed. Todd Hass.

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